IQE outpaces market

Despite the weakness of the wireless handset market during second-half 2000 (and particularly the last quarter), in Q4/2000 epi-wafer foundry IQE plc saw record profits, orders (of £12.3m) and sales (up 85% on Q4/1999 and 48% on Q3/2000). Full-year 2000 sales were a record £30.117m (58% up on 1999) and orders £41.4m.

The results were due to IQE bringing on-line increased capacity more quickly than anticipated (including four new MOCVD reactors in the UK and two new MBE reactors in the USA) as well as strong demand for optoelectronics for DWDM fibre-optic systems in long-haul and metro networks, short-haul fibre-optic links, and optical storage systems.

"We have also made good progress with WaferTechnology [acquired in late Q4] and in the launch of our new subsidiary IQE Silicon Compounds... Several new products have been successfully developed".

Including Wafer Technology, sales were £10.478m (107% up on Q4/1999 and 63% up on Q3/2000).

R&D increased more slowly, from £1.302m in 1999 to £1.87m in 2000 (6.2% of revenue), since most resources were devoted to production (especially in the first three quarters). "This has resulted in bringing a number of new and exciting products close to market, particularly in the areas of VCSELs."

IQE's strategy is to develop a broad product portfolio to ensure a lack of dependence on any one sector. Also, as an outsource epiwafer foundry, services are attractive during a recession as many companies are loath to invest heavily in capital, but still require materials for both production and development. A broad product range enables companies to quickly change their own product mix to address more rapidly growing markets.

IQE expects Q1/2001 revenues up on Q4/2000.

* IQE has released some more data on the HBTs it launched recently (see Issue 3, page 10).

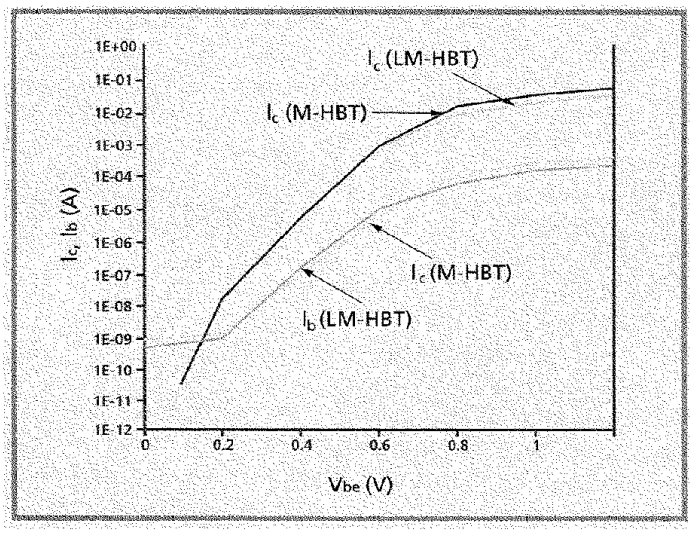

Figure 1 Gummel plots comparing DC characteristics of metamorphic HBTs (M-HBTs) and lattice-matched HBTs (LM-HBTs)

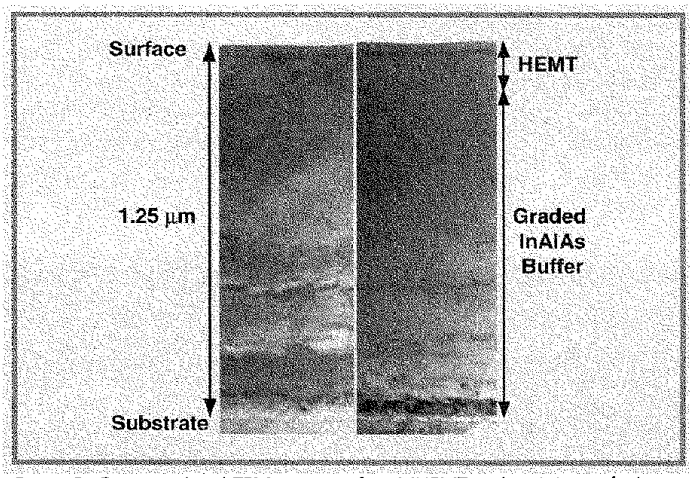

Figure 2 Cross-sectional TEM images of an MHEMT with a 1.1 μm thick InAlAs-based metamorphic buffer.

Figure 1 (above) shows Gummel plots comparing DC characteristics of metamorphic (M-) and lattice-matched (LM-) HBTs. The structures are single-heterojunction with an InGaAs collector, a 1000Å base doped at 10^{19} cm^{-3} with Be, and an InAlAs emitter. The measured current gains are 320 and 360 for M- and LM-HBT, respectively, and the corresponding base sheet resistances are 909 and 985 Ω/sq.

Figure 2 shows cross-sectional TEM images (under different diffraction conditions) of an MHEMT with a 1.1 μm thick InAlAs-based metamorphic buffer. The dislocation density at the top of the buffer is $<10^6$ cm^{-2} compared with ~ 10^9 cm^{-2} at the bottom of the buffer. (courtesy of X Xu, P Specht and C Kisielowski, Lawrence Berkeley National Laboratory).

Multi-chamber plasma etch cluster tool

At April's *Semicon Europa* exhibition in Munich, Germany Trikon Technologies Inc (Newport, UK) launched two new plasma etch products for the silicon and compound semiconductor markets:

• the Omega *f*xP multi-chamber cluster tool (combining Omega plasma etch sources with a Brooks MX 800 wafer handler and the *f*xP platform used for Trikon's Sigma *f*xP and Delta *f*xP deposition systems). This offers up to six process modules, wafer alignment and cool-down with two vacuum cassette stations;

• the Omega 201$^+$, an enhanced version of the Omega 201 featuring Trikon's plasma source technologies in a single-chamber format (including MORI, Plasma Enhanced Reactive Ion Etch and Inductively Coupled Plasma). An optional module offers secondary functions, such as post-etch corrosion processes.

"The increase in production use has led us to offer a cluster tool, incorporating the successful Omega etch chambers on our latest-generation cluster platform," says marketing vp Bernard Culverhouse. "The Omega *f*xP offers high throughput for the high-volume user alongside 'mix-and-match' of different plasma technologies for more advanced sequential etching processes of complex structures". Also, "We have upgraded the single-chamber system for those customers not requiring a cluster tool. The Omega 201$^+$ benefits include increased process flexibility, functionality and control."

* In March "at a time of low market visibility" Trikon increased its credit facilities by US$21.5m (to US$26.2m) to "support key expenditures, including development of new technologies".